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PATENT SPECIFICATION

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(54) IMPROVEMENTS IN OR RELATING TO THE PACKAGING OF ARTICLES

(71) We, BAKER PERKINS HOLDINGS LIMITED, a British Company, of Westfield Road, Peterborough, in the County of Northampton, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to packaging apparatus of the type (hereinafter referred to as the "type described") in which an article, including a uniform batch of articles of uniform shape, is fed on to a container blank positioned and supported over a forming aperture in a container-forming die and pressed downwardly with the blank into the die aperture by a reciprocating plunger, extending portions of the blank being folded, during passage into the die aperture, about the article in the form of a container, a further article then being fed on to a further blank, positioned over the aperture in the meantime, the further article and blank then being pressed into the die aperture by the plunger, the latter action of the plunger causing the previously formed loaded container to pass out of the die on to a receiving platform at a discharge station.

It has been customary to rely on friction to hold the leading loaded container in the die during the formation and pressing into the die of the next succeeding loaded blank.

The invention is particularly concerned, however, with the use in apparatus of the type described of containers in the form of trays, the tray blanks consisting of a base panel with side, end, and corner wall panels projecting from the base panel, the entry corners of the die aperture in such a case being formed in known manner with folding grooves for the corner wall portions. For consolidating such a tray structure, there is provided in the apparatus means for applying adhesive to portions of the blank corresponding to or associated with the corner wall portions, the adhesive being allowed to

set while the tray, with its contents, is held in the die during the feeding of the next succeeding article and blank.

When dealing with articles of a heavy nature such as batches of filled cans, however, it is found that the loaded trays tend to slide out of the die by gravity in advance of the entry into the die of the succeeding loaded tray with the result that the adhesive may not be properly set as the loaded trays pass from the die to the discharge station. Such tendency may give rise to difficulty, or at least inconvenience, in the further handling of the loaded trays.

An object of the present invention is substantially to avoid such difficulty or inconvenience.

According to the present invention, articles are packaged by an apparatus of the type described wherein each loaded container is transferred from the receiving platform at the discharge station to a further feeding station by a bifurcated discharge pusher formed with a trailing bifurcated platform arranged, during the discharging action, to support the preceding loaded container in the die and to move, while in supporting position, with said preceding container as it is caused by the plunger to pass out of the die on to the receiving platform at the discharge station, said receiving platform being bifurcated to allow passage of said bifurcated discharge pusher.

Conveniently, the discharge pusher is combined with a bifurcated feed pusher arranged to feed an article from a bifurcated feed platform adjacent the die aperture simultaneously with the action of the discharge pusher, a container blank being fed on to the die in the meantime.

The bifurcation of the pushers and platforms allows the pushers to pass through the platforms upon completion of the pushing operations to return to their original positions in readiness for the next operation, a further operation of the plunger and the feeding of a further article to the feed

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platform taking place in the meantime.

It will be understood that the feeding of the blanks, the operating of the pushers and the feeding of the articles take place in timed relationship, and in a preferred embodiment of the invention, the mechanism for performing those operations is controlled by a sensing device adapted to detect the correct positioning of each successive article on the feed platform, and, upon such detection, cause the mechanism to perform one cyclical operation. Thus, the sensing device may be in the form of a micro-switch controlling a motor-driven electro-magnetic 'one-rev.' clutch and brake unit of known type operating the mechanism, the microswitch being movable into and out of detecting position as part of the same cyclical operation.

The invention has been found particularly useful as applied to the packaging of articles in the form of batches of filled cans in trays. Thus, the batches may be collected from a continuous band conveyor and positioned on a stationary receiving platform as described in the specification accompanying Patent Application No. 45309/73 (Serial No. 1,464,099) the receiving platform constituting the bifurcated feed platform referred to above.

By way of example, such an application of the invention will now be described in greater detail with reference to the accompanying diagrammatic drawings, in which

Figure 1 is an elevation of an apparatus for loading a collated batch of cans on to a tray, and

Figure 2 is a further elevation illustrating the function of the transfer pushers of the apparatus.

At batch of cans 11 is collated by the mechanism described and illustrated in the specification mentioned above, the batch being moved on to a bifurcated platform 12 by a transfer member 13. Tray blanks 14 consisting of a base panel with side, end and corner wall panels, with folding grooves, projecting from the base panel are contained in a magazine 16 supported on a framework 17 of the apparatus. As collation of a batch of cans takes place a tray 14 is removed from the magazine 16 by suction nozzles 18 mounted on a block 19 carried by one arm 21 of a two-armed lever 21, 22 pivotally mounted on a shaft 23, a link 24 pivotally connecting the arm 22 to the framework 17 at 20. One end of an arm 26 is pivotally mounted on the shaft 23 while the other end is pivotally mounted on a shaft 27 secured in the framework 17. An operating arm 28 extends from the arm 26 and is pivotally attached to one end of a connecting rod 29 the other end of which is pivotally attached to an arm and lever mechanism arranged to be actuated by a cam rotated by a cam shaft 30 rotatably mounted in the framework 17

and driven by a well known type of motor driven electro-magnetic 'one-rev' clutch and brake unit (not shown). Thus, upon operation of the connecting rod 29, the suction nozzles 18 are first moved towards the magazine 16 to engage the lowermost tray 14 and then retracted to withdraw that tray 14 from the magazine 16 and place it on a support 31. As the suction supply is cut off from the nozzles 18 a pair of pusher bars 32, secured to a pair of chain conveyors 33, mounted on sprockets 34 driven from the shaft 30, engage the trailing edge of the tray 14 and transfer it to an intermediate position 36 where adhesive is applied to the corner portions of the tray 14 by applicators 37 mounted on a gum bath 38. The gum bath 38 is secured to a pair of arms 39 pivotally mounted on a shaft 41 secured in the framework 17, one of the arms 39 being connected by a rod 42 to an arm and lever mechanism arranged to be operated by a cam rotated by the shaft 30.

Upon completion of the application of the adhesive a further pair of pusher bars 43, secured to a further pair of chain conveyors 44 mounted on sprockets 46 and driven from the conveyors 33, then engage the trailing edge of the tray 14 and transfer it to a position over an aperture of a forming die 47 where the leading edge of the tray 14 is held in position by a pair of trapper fingers 48, the fingers 48 being moved into and out of trapping position by a rod 49 pivotally attached to an arm and lever mechanism arranged to be actuated by a cam rotated by the shaft 30.

When a tray 14 has been positioned over the die 47 a collated batch of cans 11 is transferred from the support 12 on to the base portion of the tray, the batch of cans 11 and tray 14 then being pressed downwardly into the die 47 by a reciprocating plunger 51, the side and end wall panels being folded, during such action, about the batch in well known manner. The plunger 51 is secured to an arm 52 pivotally attached to a pair of parallel motion arms 53, 54 the arm 53 being pivotally mounted on the shaft 41 and the arm 54 being pivotally mounted on a shaft 56 secured in the framework 17. A rod 57 is pivotally attached at one end to an extension 58 of the arm 53, the other end of the rod 57 being pivotally attached to an arm and lever mechanism arranged to be actuated by a cam rotated by the shaft 30.

The collated batches of cans 11 are transferred, in succession, from the platform 12 on to successive trays 14 as mentioned above by a bifurcated feed pusher assembly comprising a series of pushers 59 each extending from a platform 61 which is also provided with a discharge pusher 62 which, as the pushers 59 transfer a batch of cans on

to a tray 14, transfers a loaded tray from a bifurcated support 63 located beneath the die 47 on to a delivery belt conveyor 64. The platform 61 is pivotally mounted on shafts 66 and 67 carried by pairs of arms 68 and 69, respectively, each arm 68 being pivotally attached to one arm 71 of a two-armed lever 71, 72 pivotally mounted on a shaft 73 mounted in the framework 17. An extension 74 of the arm 71 carries a roller 76 arranged to run in a cam track 77 formed in a disc 78 secured to the shaft 30. Each arm 69 is pivotally attached to one arm 81 of a two-armed lever 81, 82 pivotally mounted on a shaft 83 mounted in the framework 17, the arm 82 being pivotally connected by a rod 84 to the arm 72. A further rod 86 pivotally connects one of the arms 69 to a crank 87 secured to the shaft 30.

Mounting the platform 61 on such a linkage causes the pushers 59 and 62, during operation of the apparatus, to move in a parallel path during the forward stroke and then lower to clear the platform 12 and support 63, respectively, on the return stroke, such movement being illustrated in Figure 2 by the chain-dot arrowed lines indicating the path of movement of the shafts 66 and 67.

It will be understood that the feeding of the trays 14, the operation of the pushers 59 and 62 and the feeding of the cans 11 takes place in timed relationship, and the mechanism for performing these operations is controlled by a sensing device adapted to detect the correct positioning of each collated batch of cans 11 on the platform 12 and, upon such detection, cause the clutch and brake unit to perform one revolution so that the mechanism performs one cyclical operation the switches 88 being moved into and out of detecting position as part of the cyclical operation. The sensing device comprises micro switches 88 carried by a common support 89 secured to a link 91 itself pivotally attached to arms 92 and 93 pivotally mounted on the shafts 41 and 56, respectively. A rod 94 is pivotally attached at one end to an extension 96 of the arm 93, the other end of the rod 94 being pivotally attached to a suitable arm and lever mechanism arranged to be actuated by a cam rotated by the shaft 30.

In operation, the apparatus is first "primed" by placing a previously loaded tray of cans 11 on the platform 63 below the die 47 and a further loaded tray in the die 47 and supported on the lower loaded tray. A tray blank 14 is also placed on the support 31 at the intermediate position 36 below the adhesive applicators 37. As mentioned above, a batch of cans is collated on the platform 12 as described in the specification mentioned above and, when the switches 88 have been contacted by the lead-

ing cans 11 in a batch, the clutch unit is energised to commence the cycle of operations whereupon the pushers 59 are raised to engage the trailing cans in a batch (see Figure 2) and then operated to transfer the batch on to the tray blank which has, in the meantime, had adhesive applied to the corner portions and then been transferred by the pushers 43 over the mouth of the die 47 in readiness to receive the batch of cans 11. Simultaneously with the transferring movement of the pushers 59, the pushers 62 transfer the lowermost filled tray below the die from the support 63 on to the conveyor 64, the loaded tray in the die 47 being supported in the meantime on the platform 61. Upon completion of the forward transferring movement of the pushers 59 and 62 they are lowered, as mentioned above, clear of the platform 12 and support 63, respectively, and retracted to their former position in readiness for the next transferring movement.

During the lowering and retracting movement of the pushers 59 and 62 the loaded tray in the die is lowered on to the support 63 by the platform 61, and the plunger 51 is operated to press the collated batch of cans 11 and tray 14, positioned over the mouth of the die 47, into the die, such action causing the wall panels of the tray to fold about the batch of cans 11, this loaded tray being supported in the die by the lower loaded tray resting on the support 63. It will thus be seen that, provided collated batches of cans 11 are supplied to the platform 12 in regular succession, the cycle of operations will be repeated continuously.

With such an apparatus it will be appreciated that each loaded tray of cans transferred into the die 47 is either supported on a previously fed loaded tray or on the bifurcated platform 61 there being no danger, therefore, of a loaded tray sliding out of the die 47 by gravity.

WHAT WE CLAIM IS:—

1. Packaging apparatus of the type described wherein each loaded container is transferred from the receiving platform at the discharge station to a further feeding station by a bifurcated discharge pusher formed with a trailing bifurcated platform arranged, during the discharging action, to support the preceding loaded container in the die and to move, while in supporting position, with said preceding container as it is caused by the plunger to pass out of the die on to the receiving platform at the discharge station, said receiving platform being bifurcated to allow passage of said bifurcated discharge pusher.

2. Apparatus as in Claim 1, wherein the discharge pusher is combined with a bifurcated feed pusher arranged to feed an article

from a bifurcated feed platform adjacent the die aperture simultaneously with the action of the discharge pusher, a container blank being fed on to the die in the meantime.

5 3. Apparatus as in either of Claims 1 and 2, wherein the feeding of the blanks, the operating of the pushers and the feeding of the articles take place in timed relationship, and wherein the mechanism for performing those operations is controlled by a
10 sensing device adapted to detect the correct positioning of each successive article on the feed platform and, upon such detection,
15 cause the mechanism to perform one cyclical operation.

4. Apparatus as in Claim 3 wherein the sensing device is in the form of a micro-switch controlling a motor-driven electro-magnetic 'one-rev.' clutch and brake unit
20 of known type operating the mechanism, the

micro-switch being movable into and out of detecting position as part of the same cyclical operation.

5. Apparatus as in any of Claims 2 to 4, 25 wherein the batches are collected from a continuous band conveyor and positioned on a stationary receiving platform as described in the specification accompanying Patent Application No. 45309/73 (Serial No. 30 1,464,099), the receiving platform constituting the bifurcated feed platform.

6. Packaging apparatus substantially as described.

7. Apparatus for the packaging of 35 articles of the form of batches of filled cans in trays substantially as described with reference to the accompanying drawings.

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